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PATENT SPECIFICATION

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NO DRAWINGS.

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COMPLETE SPECIFICATION.

A Process for the Treatment of Liquids, More Particularly Preservation Thereof.

We, OSTERREICHISCHE STUDIENGESellschaft FÜR ATOMENERGIE GES.m.b.H., an Austrian Body Corporate of 10, Lenaugasse, Vienna VIII, Austria, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a process for the treatment, more particularly preservation, of liquids of all kinds, especially beverages.

There are a number of existing processes for preserving beverages and/or increasing their storage life. Heat pasteurisation is a process widely used in the most diverse forms. In this process, the commodity is treated for a time, varying from a short to a long period dependent of the particular form of the process, at a temperature of 70°C or more. In addition, chemical preservatives, ultra-filtration techniques, sterile filling techniques and low-temperature refrigeration storage methods are employed.

Heat preservation has the advantage that it can be carried out on the already packaged commodity, but, on the other hand, it has the disadvantage that organoleptic changes (cooking flavour changes) generally occur in the beverage.

Chemical preservatives are generally permitted by law only to a very limited extent and in many countries are prohibited altogether.

Other processes, such as, for example, ultra-filtration, require a sterile filling technique and are not only costly but also entail relatively high losses.

Low-temperature refrigeration storage has the advantage that the flavour is largely conserved, but, because of the costly equipment,

is practicable only for limited quantities of special products.

The invention has for its object to provide a process of preserving goods packaged in an unsterile state, whilst avoiding the occurrence of organoleptic changes. The invention is based on the realization that known processes for the ionising irradiation of beverages with δ -radiation have hitherto generally resulted in preservation only when such a dose of radiation has been applied in itself to cause organoleptic changes in the beverage.

According to the invention, it is proposed that liquids of all kinds, especially beverages, to be treated, and in particular preserved, be irradiated with δ -radiation, and also be subjected to a physical, physico-chemical and/or chemical treatment.

The dosage of the δ -irradiation required for the preservation is substantially lower when this method of treatment is combined with another physical, physico-chemical and/or chemical method of treatment. The dose of radiation may be below one half of the minimum value which would be necessary with δ -radiation alone.

If, for example, a low dose of δ -radiation which, by itself alone, does not result in any preserving effect, is combined with slight heating which likewise does not possess any preserving action in itself, a storage product is obtained the organoleptic qualities of which are substantially better than those of a product which is preserved only by heat or only by radiation. Another advantage also lies in that this process can moreover be carried out on packaged goods.

Depending on the nature of the combination process, the physical, physico-chemical and/or chemical treatment is applied before,

during or after the irradiation treatment.
A number of Examples are given herein-
after.

EXAMPLE 1;

- 5 Combination of irradiation and heating:
If freshly pressed apple juice is heated to
50°C and is kept at this temperature for 40
minutes, it begins to ferment after about
nine days when stored at room temperature.
10 If freshly pressed apple juice is irradiated
with Co 60 rays with a dose of 0.3 Mrad,
it begins to ferment after about eight to ten
days when stored at room temperature. If
15 freshly pressed apple juice is now irradiated
with this dose of the said δ -radiation and
heated at the same time or immediately
thereafter to 50°C and left at this tempera-
ture for ten minutes, no fermentation
20 phenomena show themselves when the juice
is stored at room temperature.

EXAMPLE 2;

- Combination of irradiation and heating:
After a treatment, i.e. the action of heat
at 50°C, over a period of 35 minutes, freshly
25 pressed grape juice begins to ferment after
six days. If freshly pressed grape juice is
irradiated with a δ -radiation dose of 0.5
Mrad, it begins to ferment after about nine
days. If grape juice is given a δ -radiation
30 dose of 0.5 Mrad and is left for ten minutes
at a temperature of 50°C, the grape juice can
be stored without fermentation occurring.

EXAMPLE 3;

- Combination of irradiation and chemical
35 addition:

If vitamin K₁ in a proportional amount
less than that normally required for preser-
vation is added to the apple juice and it
is given a δ -radiation dose of 0.3 Mrad, the
40 apple juice can be stored.

Of course, the irradiation with δ -radiation
may also be combined with other methods of
treatment, for example utilising ultrasonics
or chemical preservatives in amounts which
45 are far below the amount that is usually re-
quired for preservation. Which form of ionis-
ing δ -radiation is used is of secondary im-
portance.

It will be seen from the above Examples
50 that the dose of radiation for preservation
purposes, which with δ -radiation is norm-

ally 1 Mrad or more, can be reduced to
below one half that value with the δ -radia-
tion used in the process according to the
invention.

We are aware of The Food (Control of
Irradiation) Regulation 1967 and in so far
as our invention relates to the treatment of
liquids for human consumption to be sold
in England and Wales, we make no claim
60 to use of the invention in contravention of
the law.

Subject to the foregoing disclaimer,
WHAT WE CLAIM IS:—

1. A process for the treatment, particu- 65
larly preservation, of liquids of all kinds,
especially beverages, wherein the liquid is
irradiated with ionising δ -radiation and is
also subjected to a physical, physico-
chemical and/or chemical treatment. 70

2. A process according to claim 1,
characterised in that the liquid is heated
during and/or after the irradiation treatment.

3. A process according to claims 1 and 75
2, characterised in that the irradiated liquid
is kept at a predetermined temperature for
a predetermined time.

4. A process according to any one of
the preceding claims, characterised in that 80
for the purpose of chemical treatment, a
chemical substance, for example a preserva-
tive or a vitamin such as vitamin K₁, is
added to the liquid in an amount less than
that normally required for the purpose of
preservation of said liquid. 85

5. A process according to any one of the
preceding claims, characterised in that the
dose of δ -radiation is below one half of that
which would be required to sterilize a liquid
when using δ -radiation alone. 90

6. A process for the treatment, particu- 95
larly preservation, of liquids of all kinds,
especially beverages, substantially as herein
described with reference to Example 1 or
Example 2 or Example 3.

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